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ON THE

PREPARATION OF COOKED FOOD

FOR THE

FATTENING OF CATTLE.

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THE proper feeding of cattle and sheep, so as cheaply to produce good beef and mutton, is an object of great importance to the farmer, seeing that no agricultural produce in the kingdom is so steady and remunerative in price as our fat stock.

The introduction and application of bones and guano as manure for raising turnip, particularly on lands difficult to cart farm-yard dung upon, and the eating off such green crop by means of sheep fattened upon the ground, have materially altered our practical husbandry, and improved the agricultural condition of every important tillage district in Britain—thus tending greatly to increase and improve in condition all kinds of lean and fat stock: and the modes of stall-feeding have also undergone progressive changes and improvements since the use of bones and guano was extensively resorted to. Soon after the increased transit of cattle and sheep (consequent upon the extended growth of turnip) to the large fat markets of the kingdom, intelligent and spirited feeders began to see that a portion of grain and salt given along with raw turnip, rapidly benefited the stall-fed stock; and experiments being pushed still farther, the use of oilcake, as auxiliary food, was tried, and found greatly to promote the fattening process. Such innovations, however, upon the former practice, were at first ventured upon by comparatively few, many treating with ridicule the novelty of feeding cattle and sheep upon grain and oilcake, while others, more prejudiced, gave these innovations a decided but fruitless opposition; for long and careful experience has now proved, that with cleanliness, punctuality, and good management, the plan of giving fattening stock *mixed*, *varied*, and *enriching food*, produces the most beef and mutton—meat of the best quality, and at the least expense—an article which readily commands a remunerating price in every market.

The change of giving light or tail grain, and a portion of oilcake along with raw turnip, was no doubt superior to the previous meagre practice in feeding; but recent well-attested trials seem to have laid the foundation of a still more advantageous system, namely, the feeding of stock with a proper preparation and mixture of cooked linseed, bruised grain, and raw turnip, or other vegetables and roots. To show in what this new and improved practice consists, and in what it differs from the former one, is the object of the present paper. The principle of feeding with part of *cooked* and part of *raw food* is not opposed to oilcake feeding, but differs from it merely in the working out of the principle; the difference being simply this—that the fattening properties of the linseed, boiled with a sufficiency of water, form an oily or mucilaginous liquid, which, when poured over cut straw or hay, and bean, or barley meal, all being well mixed, are found to make more palatable and nutritious food for cattle than bruised oilcake and dry uncut straw. One great advantage, too, in using linseed instead of oilcake, is the averting of the possibility of adulteration and fraud in purchasing the raw material. Oilcake is merely the refuse of linseed from which the oil has been forced by great pressure, and it has too often been found to be mixed up with inferior seeds. But in purchasing the entire linseed, every farmer has it in his power to judge of its weight and quality—in other words, to avoid adulteration and fraud. That the residue and husk of linseed, of which oilcake is chiefly composed, has good feeding properties, is not to be doubted; but, that the quality of the food prepared from linseed will be richer when formed from the entire and ground linseed, instead of the compressed seed, or oilcake, seems equally free of doubt; and when properly reduced in oleaginous strength by the admixture of bruised grain and chaff, or cut straw, it has been found to be cheap and healthy food. It is attended also with a very large saving of turnip and straw, nearly one-half of the former, and one-third of the latter; besides, by such feeding, the meat of the animal is better mixed—the fat being ingrained with the flesh and muscle, instead of being laid on in flabby layers, as is too often the case when oilcake is used.

These advantages, resulting from the improved system of stall-feeding hinted at, are not theoretical, being deduced from a series of trials carefully executed by practical agriculturists in various parts of Britain, whose reports we shall endeavour to give in a distinct though abridged form.

I. *Yorkshire.*—The feeding of cattle partly on cooked food, along with diminished quantities of turnip, has been carried on for several years in this extensive and rich agricultural district. It has been successfully proved and recommended by Mr Marshall, Holme Lodge, Bedale, Yorkshire; by H. S. Thompson, Esq. of Moat Hall, near York; John Hutton, Esq. of Sowberhill, near Northallerton; T. S. Walker, Esq. of Maunby Hall, near Thirsk; and others. The experience of these agriculturists will be found fully detailed in a Prize Essay on this subject by Mr Marshall, which forms part of the *Transactions of the Yorkshire Agricultural Society*, and was last year published as a pamphlet by Ridgway, Piccadilly, London. It is recommended as well worthy of perusal. Previous to these trials, the practice of Messrs Marshall, Hutton, and others, was to feed with raw turnip, hay or straw, and oilcake. After ample and careful trials to prove which system is the best, these gentlemen have come to the conclusion, that feeding with bruised linseed cooked, and with grain, chaff, cut straw or hay, and a diminished quantity of turnip, is superior to their former mode of feeding. The cattle are found to improve in less time upon food when partly cooked and partly raw. The following is the compound used by Mr Marshall for each beast per day, which is prepared in the following way and proportions:—2 lbs. of bruised linseed is boiled in 3 gallons of water upwards of two hours, and 5 lbs. of oats, beans, or barley, ground fine, is mixed up with 10 lbs. of chaff or cut straw. The straw or chaff, 10 lbs. weight to each beast, is laid upon a clean floor, and 5 lbs. of the bean, barley, or oat meal is mixed well with it, when the linseed liquor is carefully poured upon the mixed straw and meal, while the whole compound is kept stirring about with a three-pronged fork, till the cut straw and meal become completely saturated with the linseed mucilage. It is then shovelled up, of course in its warm state, into a heap, beat close with a spade, and left thus stoving or cooking a considerable time before it is cool enough to be used. Two hours after being so mixed, the mass will be cool enough for the cattle. It will do more good when given warm than cold. The quantity and proportions of linseed-meal and chaff now specified are given by the Yorkshire feeders to each beast per day; and the mess is divided into two equal parts, so that the animal must have at each feed 1 lb. of linseed, 2½ lbs. of bean, barley, oat, or Indian meal, and 5 lbs. of chaff, cut straw, or hay. The general feeding of the cattle is managed by giving raw turnip and the compound cooked food alternately. At 6 o'clock A.M. the feeder gives each beast from 35 to 40 lbs. of Swede turnip sliced; at 10 o'clock, a feed of the cooked food mixture is given in the proportions above specified, viz., 1 lb. of linseed, 2½ lbs. of meal, and 5 lbs. of cut straw; at 1 o'clock, the same weight of turnip is given; and at 5 afternoon, a similar feed of the compound is repeated to each beast; and finally, when the feeder leaves the cattle for the night, he puts a little uncut straw or hay into the rack of each. Thus, supposing a farmer to feed 20 cattle according to this new plan, he would prepare his cooked food twice a-day. This is necessary to make the mixture fresh and palatable, and the feeding-troughs or portable boxes ought to be cleaned out with water after the animal has taken his food. Each time the feeder makes cooked food for the 20 cattle, he will use 30 gallons of water, 20 lbs. of linseed bruised, and 50 lbs. of ground beans, barley, or oats, or proportions of each, the aggregate amounting to 5 lbs. The linseed, when boiled for 2 hours, must be poured on the 100 lbs. (or 5 lbs. for each beast) of chaff or cut straw, previously mixed thoroughly with the crushed grain, which being all well stirred, as before directed, and shovelled up into a heap, would, when cool, be divided among the 20 cattle by filling 20 equal-sized feeding-boxes or troughs. This process would require to be gone through twice a-day, morning and afternoon, the two turnip feeds being given, as before explained, alternately with the cooked feeds. This mode of feeding, with the steaming apparatus used, and all particulars necessary to explain its working and results, will be found most satisfactorily illustrated in Mr Marshall's pamphlet, before referred to. The expense of the apparatus may be stated at £50, exclusive of a linseed-crusher and chaff-cutter. Fortunately, by the subsequent examples which we have to give of cooked food manufactured in other counties, it will be seen that the linseed can be cooked quite well in common boilers, which every farmer ought to have. The objection of expense, as to the apparatus, which many might be apt to state against the Yorkshire plan, will thus be obviated. As to the cost of a linseed or grain-crusher, and a straw or hay-cutter, this should not be regarded as extra expense, as every farmer, to promote the general economy of his establishment and the health of his stocks, ought to use these useful and profitable machines on his farm. The expense of carrying out this system of feeding, a very important element in the matter, is shown, by Mr Marshall's detailed and circumstantial estimate, to amount to from 6s. to 7s. per week for a full-sized bullock; and a correspondent of the *Gardeners' Chronicle*, who last year inspected the feeding operations alluded to, as carried on upon the extensive farms (1400 acres) of Mr Hutton of Sowberhill, in effect corroborates that estimate. He examined Mr Hutton's whole stock and premises; saw the cooked food made, and highly approved of the compound linseed, crushed grain, and cut straw. Mr Hutton furnished him with a specification of the expense, which we now give, because practically useful:—

FOR ONE BEAST PER WEEK.

13 lbs. of linseed, bruised, or 2 lbs. per day for six days, and 1 lb. on Sunday, ...	£0	1	9
32½ lbs. of ground corn, or 5 lbs. per day for six days, and 2½ lbs. on Sunday, at 1d. per lb. . .	0	2	8
35 lbs. of Swede turnip, given twice a-day and thrice on Sunday, ...	0	1	6
Coals, 1½d.; labour on each beast, 6d., . . .	0	0	7½
Total expense of each beast, . .	£0	6	6½

Mr Hutton put up two lots of cattle, feeding them for eight weeks, the one lot with oilcake, turnip, and straw: the other lot with linseed cooked, ground grain, cut straw, and turnip. The latter lot cost least to feed, and paid best when sold. Another great advantage of the system is, that it does well in feeding wintered and young cattle, either for the fat market, or as preparative to the putting them on good grass. "In the first week in April 1845 I (Mr H.) put 60 head of cattle on prepared food, and found the plan to answer remarkably well. Of these about 20 were in a very forward state; they were allowed to have prepared food at the rate of 5s. 3d. per head per week. They made great improvement, and were sold by the 9th of July, several of them fetching £20 each." Mr Hutton gave his fold-yard cattle (or winterings,) cows, and young stock, one meal per day of a weaker kind of prepared linseed food, costing 2s. 4d. per head per week, and turned them to grass in vastly superior condition to winterings as usually kept. He approves of the cooked food plan for stall-fed, store, dairy, or young cattle, regulating the supply and quality according to each class. It answered equally well with his horses and sheep. He says, " What I have seen of this system convinces me that certainly *double the quantity of stock* can be maintained with the same quantity of turnip as was consumed by the old method of feeding cattle. The manure is of the best quality, and very soon fit for use. No manure I have seen has equalled in efficacy that derived from this process. Hence it is hard to fix any precise limits to the number of stock that may be maintained on a farm, with a moderate supply of turnips, when this method is rightly carried out and persevered in." Mr Marshall, in his pamphlet, after giving his calculations, states, that " under this mode of feeding, three-year-old heifers increased in weight (calculating by measurement) during the time they were tied up, on an average of the whole lot, about 14 pounds each per week. Two of them made 20 stone each in 16 weeks." He found it to answer well with his horses. As to the manure, he says— " The increased quantity and superior quality of the manure thus derived have doubled the produce of the farm. Independently of other matters, the main source from which the feeder of stock should look for remuneration is his manure heap. He cannot grow corn without manure, nor have manure without cattle. Whoever can feed the largest quantity of stock, and thus secure the most and richest manure at the cheapest rate, is best calculated to augment the produce of his farm, and thus to meet competition in the market. The effect of this system has been so apparent in the increased fertility of the farm where it has been practised, as to induce my neighbours to follow my example."

H. S. Thompson, of Moat Hall, York, who previously used oilcake instead of the linseed cooked food, states the following as the result of a careful experiment made by him to prove which was the best. He says, in a communication published in the pamphlet before alluded to—"My previous system having been found to work well, I determined to give it a fair chance against the new one; and I accordingly selected two of the most thriving of a lot of 12 bullocks, of nearly the same age and condition, and fed them, for the first month, on the food I had been in the habit of giving, viz., Swede turnip, linseed-cake, and bean-meal, in the proportions stated below. Two others, of nearly equal weight, had their food prepared according to your directions. All four were weighed at the commencement of the experiment, viz. April 11th, 1846. Their weights are given in table No. I. The numbers are the numbers of their stalls, to prevent mistakes. Nos. 8 and 9 were fed in the new way; Nos. 12 and 13 in the old. They were weighed a second time on the 15th of May.

Table No. I.

No. of stall.	Live weight, April 11.		Live weight, May 15.		Increase of weight.	
	st.	lb.	st.	lb.	st.	lb.
8	83	8	88	4	4	10
9	79	8	85	1	5	7
12	81	0	85	2	4	2
13	85	0	89	0	4	0

Thus it will be seen that the bullocks fed on the old plan gained 8 st. 2 lb. in five weeks; and those fed in the new way gained 10 st. 3 lb. in the same time. As I was convinced that the two bullocks which had made the least progress were, nevertheless, the most thriving animals, I for the next month fed all four alike, viz. on swedes, mangel wurzel, and your prepared food. The results are as follows:—

TABLE No. 2.

No. of stall.	Live weight, May 15.		Live weight, June 15.		Increase in weight.	
	st.	lb.	st.	lb.	st.	lb.
8	88	4	92	4	4	0
9	85	1	90	12	5	11
12	85	2	92	7	7	5
13	89	0	96	0	7	0

The impression that the bullocks Nos. 12 and 13 were better thrivers than Nos. 8 and 9 was, it will be observed, fully borne out when the four were fed alike, the latter two having made 14 st. 5 lbs. in 31 days, and the former only 9 st. 11 lbs. If we compare the increase of weight of the two bullocks, Nos. 12 and 13 when fed on the old plan for 34 days, viz., 8 st. 2 lbs. with the increase of the same bullocks, when fed on your plan, for 31 days, viz. 14 st. 5 lbs., the superiority of the method is very apparent." Mr Thomson then gives an account of the expense of feeding both lots per week, which amounted to the same sum for each lot.

To show what, according to Mr Thomson's experience, can be done with store or wintered cattle, (when grass is scarce or backward,) consider the following example given by him: "The 12 bullocks, mentioned above, were in March taken lean from the straw-yard—quite unfit, in fact, for tying up to feed, except by way of experiment; yet they made such rapid progress, that some of them were sold to the butchers at 7s. 3d. per st. at the end of May; and the last were sold the third week in June, in good killing condition."

So much for the Yorkshire practice. Let us glance at other important agricultural districts.

II. *County of Norfolk.*—This county took the lead in improved husbandry at an early period, and by the growth of turnips, and the feeding of cattle and sheep with grain and oilcake, accumulated large collections of manure, which, when worked into large breadths even of inferior light soils, greatly increased the produce of that district in good grain and pastures. The use of large supplies of oilcake, with cut straw and varied green crops, have for many years enabled the farmers of Norfolk and Suffolk to send to Smithfield numerous lots of cattle of the best quality, which otherwise could not have been produced. Latterly, the adoption of box-feeding, with cooked linseed, and bean or barley meal, has been successfully pursued, and, it is thought, will ultimately supplant the older practice of feeding with oilcake. Mr Warnes of Trimingham has for years advocated the new system, and practised it by feeding his cattle, sheep, and horses upon the compound linseed food. He carries it on both winter and summer, having a definite number of simple and cheap wooden boxes always occupied with cattle, one in each box; and, as they are fattened, their places are supplied with lean ones, to undergo the same process. The cooked compound is made in a way similar to that manufactured in Suffolk and Cornwall, afterwards to be explained. Common boilers are used, into which the linseed meal is carefully stirred for a short time, and likewise a proportion of bean meal and other grain ground fine. In a short time it is taken out of the boilers and turned into tubs or barrels, and, when cool, is cut up and given to the cattle, mixed with chaff, cut straw, or hay. In winter, Mr Warnes gives two feeds of this compound per day, with two feeds of turnip in alternate order, as practised in Yorkshire. In summer, as a substitute for turnip, two feeds of Italian grass, rye-grass, or rye fodder, is given after being cut and thoroughly saturated with weak linseed liquor. Those interested in such investigations will find Mr Warnes' mode of culture of flax, and production of linseed, as well as his management of the feeding of cattle, horses, and sheep, ably explained in an article by George Nicholls, Esq., in the *Journal of the Royal Agricultural Society of England*, part II. of volume VIII., published in December 1847.

III. *County of Suffolk.*—Here the feeding with cooked linseed food has been extensively, adopted in preference to oilcake. Mr Raynbird in Hengrave, Bury St Edmunds, has published a useful pamphlet, showing how it is managed in that important agricultural county, and that "many Suffolk farmers, during the last few years, have substituted compound in lieu of linseed cake." Much useful information as to it will also be found in the Appendix (marked I. Linseed Compound) to an article by that gentleman, "On the Farming of Suffolk,"* in the Agricultural Journal, and number above referred to; and of which, for the convenience of those who have not access to the article itself, we will now give a short account.

Common boilers are used in Suffolk instead of the Yorkshire steaming apparatus; and next the linseed, which is ground into meal, instead of being poured in a state of oily liquor upon the cut straw and crushed grain, or pulse, is boiled completely up with the meal, and then turned out of the boiler into tubs, or other vessels, where, when cool, it forms a rich mucilaginous jelly or pudding, which is cut up and given to each beast at the rate of from 1 to 2 stones per day, along with cut hay or straw, and to sheep at the rate of from 2 to 3 lbs. per day. The simple and cheap boilers are better adapted to encourage extensive imitation on the part of the generality of farmers than a steaming apparatus costing £50, and are less liable to be mismanaged in the working. But to an agriculturist of capital and extent, we have no hesitation in at once recommending for adoption Mr Marshall's apparatus and management, as described in his pamphlet and diagram. To be practical, we will describe the cooking process, ingredients, and cost of the food. Suppose 68 stones of the Suffolk compound is required to be made, put 64 gallons of water into a 100-gallon boiler, to which add two bushels of crushed beans or peas, and then kindle the fire. Boil these nearly three hours, when the contents will be of the consistency of pea-soup; then cause a person to sprinkle into it regularly by hand two bushels of bruised linseed, while another person keeps stirring the soup mixture. Proceed also to sprinkle in a similar way six bushels of bruised barley, stirring it well all the while (to prevent the meal from burning in the boiler) until the whole ingredients are completely mixed and cooked. Then put off the fire by closing the damper, and fit on the boiler lid. The compound can remain in the boiler, or be put into another vessel. In a few hours it can be cut up and given to the cattle. These materials so cooked, Mr Raynbird states, willfill the 100 gallon boiler, and weigh 68 stones.

Cost of 68 stones of this compound.

2 Bushels or 7 stones of Peas,	£0	7	0
6 Do. of Barley, 15 stones 6 lbs.,	0	15	0
2 Do. of Linseed, 4 stones and 8 lbs.,	0	6	6
Attendance, &c.,	0	1	6
	£1	10	0

The ratio of expense per stone, (30 shillings for 68,) gives 5¼d per stone, or £3, 10s. for 160 stones, or a ton-weight, —a moderate cost compared to oilcake at £11 per ton, even though double the quantity or weight of the former be given in feeding. But according to the Cornwall plan of manufacturing such compound into cake, (afterwards detailed,) it goes as far in feeding—*weight for weight—as oil-cake.*

IV. *Gloucestershire*, Whitfield Farm.—Mr Morton, the agricultural editor of the *Gardeners' Chronicle and Agricultural Gazette*, a journal of the highest authority and use in rural economy, gives his testimony in favour of the linseed compound food, from his experience and management of Lord Ducie's example farm of Whitfield, near Bristol, thus :—In reviewing the report of Mr Thompson's speech, delivered at a meeting of the Yorkshire Agricultural Society, he says, in his journal, No. 43, of date 23d October 1847—"As to this, we can add our own experience also, which has extended over three winters. The plan we have adopted is this,—a bushel of straw chaff for every bullock is thrown down on the floor and fashioned into a bed about eight inches thick : 1 lb. of linseed meal for every bullock is boiled for about ten minutes, in sufficient water to make a very thin mucilage, and this is thrown over the chaff, which is then mixed up : after being spread out again, 2 lbs. of bean-meal for every bullock are dusted over the bed, and after the chaff has again been turned once or twice, so as thoroughly to mix the meal, and allowed to stand half-an-hour to cool, it is served out to the animals. This is repeated twice a-day, and, with the daily allowance of 1 cwt. of roots a-piece in three meals, and straw chaff *ad libitum*, the animals will rapidly fatten." Mr Morton's plan, it will be seen, is very analogous to that before described as successfully practised in Yorkshire.

V. *Cornwall.*—At the annual meeting of the Cornwall Agricultural Association, held in December 1847, the following plan of manufacturing linseed and grain cake for cattle was submitted to the meeting as successfully practised :—Mr Davey, a farmer, who used loose boxes on Mr Warnes' principle, took 23 lbs. of crushed linseed, gradually mixing it in a boiler containing 21 gallons of boiling water ; after which he put into the boiler (gradually mixing the whole as it boiled) 84 lbs of rye meal, and a couple of handfuls of salt. The mixture being well stirred for a quarter of an hour, was then poured into tin moulds, forming cakes of 7 lb. each. The quantities and ingredients before mentioned would make 36 cakes, which could easily be manufactured by a man and two girls in half-an-hour. Each beast, when put up, was allowed one of these cakes, or 7 lbs. of compound per day ; and, in addition, got one bushel of cut straw, chaff, or hay, mixed with a very weak linseed liquor, composed of 12 lbs. of ground linseed, and 240 lbs. of water, which, being well boiled, was poured over 50 bushels of the chaff, hay, or straw. The feeder also gave each beast three-quarters of a cwt. of swedes per day, in three feeds. The expense of feeding in this way (when *extra cake* was given) was estimated at one shilling per day,—much the same as the Marshall plan; and the Cornwall compound having been tried against oilcake, *weight for weight*, was found to be superior, and much cheaper, as, when oilcake was costing from £10 to £12 per ton, this linseed and grain compound could be manufactured (at the present market price of the materials, linseed, rye, beans, barley, oats, and Indian meal) at the moderate expense of from £3, 10s. to £4 per ton, or at 5½d. per stone of 14 lbs. Such is the report of the meeting referred to, as published recently in the *Mark Lane Express* journal. In addition, however, to these statistics, one of the farmers present gave the following important information, as consistent with his own experience. He said that, in 1846, he bought an indifferent lot of eight Devons at £98, (or £12, 5s. a head,) and put them up to feed on 11th November. He sold them four months afterwards, (15th March,) when they had cost for feeding, and realised as follows :—

Cost of feeding eight Devons for four months.

Tail Barley, 7½ quarters, at 24s., ...	£9	0	0
Tail Peas, 7½ quarters, at 36s., ...	13	10	0
Linseed, 3 quarters, at 56s., ...	8	8	0
	£30	18	0

Additional food.

One bushel of Steamed Hay, one half cwt. of Chaff, and one bushel of White Carrots or Swedes, each, per day, valued at . .	10	2	0
	£41	0	0

This lot of Devon cattle, sold for	£170	10	4
Deduct inlaid price, . . .	98	0	0
	£72	10	4

The lot thus paid for keep £9, 1s. 3d. each.

This return, for four months, we consider a very good one, more particularly as the expense of keep was only £5, 5s. each—of which the feeder paid for material (linseed) used, not grown on the farm, only 21s. per beast, and had not only a good profit, but a large quantity of superior manure for his next green crop. The utensils or apparatus required to manufacture this compound were stated to be only a thirty or forty gallon boiler, a hand-mill for crushing linseed (cost 50s.,) and half a hogshead or two, a few moulds, and hand-cup, a three-pronged fork, and a wooden rammer, which small articles would not cost more than 30s. Feeding on a large scale, however, would require more expensive and efficient machines.

VI. *East Lothian and Berwickshire.*—Oilcake feeding has been long practised in these famed agricultural districts of Scotland. Various trials of linseed have also been carefully made. A valuable report of experiments by Mr Bruce, Waughton, East Lothian, particularly as to sheep, will be found published in the *Transactions of the Highland and Agricultural Society of Scotland*, and in the *London Agricultural Gazette*, No. 29, 18th July 1846. Mr Bruce found linseed, when conjoined with bean meal, to form a useful and nutritious article of food for sheep.

In other Scotch counties, also, oilcake and linseed have been used along with bean and oatmeal for cows, and mixed with milk for calves, with marked advantage.

VII. *Wigtonshire.*—The Marshall system of feeding was last year very fully discussed among the members of the Rhins Farmers' Club ; and has since been tried with decided approval by several enterprising and intelligent farmers. Of late years, few, if any, of the Scottish counties have progressed more rapidly than Wigtonshire in turnip husbandry, either in point of enlarged breadths, or weight and quality. The examples shown upon the Holm farms of Lord Stair, of Col. M'Donall of Logan, and of Sir John M'Taggart of Ardwell, have no doubt greatly conduced to this beneficial result. Oilcake, along with turnip, was very generally given through the county several years ago, and a large increase of fat bullocks and sheep was the consequence, for which Glasgow, Liverpool, and Belfast afforded excellent markets.

It is several years, however, since Col. M'Douall showed the spirited example of feeding both horses and cattle upon bruised linseed, mixed with bean meal or other grain, in preference to oilcake; and we know from good authority—that of Mr M'Culloch, Col. M'Douall's factor, himself a leading agriculturist—that the new system has proved its superiority over the old one. On Logan home farm, and Auchness, are to be seen extensive and enlightened improvements in all departments of husbandry,—draining, subsoil-ploughing, the production and application of both solid and liquid manure, the management of turnip, carrot, and mangel-wurzel, and the grazing of prime Galloway cattle, the improved breed of which has for many years been persevered in and promoted at Logan, in a style and with a beneficial result not excelled, if equalled, for that kind of stock, by any other county in the kingdom. That enlightened agriculturist, by proper cultivation, has grown, without deterioration of his land, flax principally for its seed, which being prepared by bruising and boiling with the light grains of the farm, with bean, barley, and oat or Indian meal, and mixed with chaff, cut straw, or hay, has been given in a way similar to the Marshall compound, from 4 to 8 and 12 lbs. being given lukewarm per day to each beast, with two or three feeds of good turnip in alternate succession. Liquid manure tanks have been constructed on the best principle, and great value is placed at Logan upon their saving and effect. Colonel M'Douall's splendid Galloway oxen, which obtained in successive years high premiums, and still higher encomiums, at the Highland Agricultural Society's shows in Scotland, were so fed. He fed upwards of 145 prime Galloways at Logan last winter, and his factor about half as many at Auchness, fattened in a way similar to the Yorkshire plan; and, when the new onsteading of Logan home farm shall be finished, (it will be one of the most extensive and complete in Britain,) Col. M'Douall will have, by his plan, accommodation for feeding 350 cattle each year, and for 50 horses, besides the cows of the home farm. Mr M'Culloch, Auchness, has pursued the same plan upon his farm adjoining Logan, which has answered well—he being able to feed, with the same quantity of turnip and fodder, nearly double the number of beasts, and vastly to increase the quantity and value of the manure. His offices are quite complete for the size of his farm, and an example worthy of consideration and imitation by the landlords and factors of the surrounding parishes, or of other counties. He has a liquid tank of the most substantial construction, in the centre of a covered manure-house, into which the whole solid and liquid manure is introduced from all the feeding-houses and stables, and from which evaporation or loss cannot occur.

Mr M'Bryde, Balker, and Mr Gibson in Beoch, who have extensive stocks of sheep and cattle, dairy, grazing, and feeding stocks, have adopted the linseed cooked food system, with chaff, ground grain, &c., and find it to be very superior to the oilcake feeding plan. They put up boilers, and got linseed crushers, and chaff cutters, for the purpose; and now the compound, as manufactured by Mr Marshall, is given, by these spirited and enlightened practical farmers, to all their cattle, in quantities according to age and class.*

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* Mr Gibson has built a large liquid manure tank, with metal pump, &c., to put all his liquid upon his dunghill and compost, or to take it by a cart and barrel to his green crops and grass, for cutting and soiling.

Since the above was put in type, the writer has had a note from Mr M'Bryde, in which he expresses himself decidedly in favour of the Marshall system of feeding. He had, since October last, fattened two large lots of cattle, the one lot being tied up after the other was sold fat. He says, "I have fed my horses with one

VIII. *Dumfriesshire and the Stewartry of Kirkcudbright.*—These counties export to Liverpool large lots of fat cattle and sheep, fed chiefly on turnip, and hay or straw uncut, with a portion of oilcake or ground oats. The practice of using cooked food, as recommended in Yorkshire, has not here been attempted to any material extent. Sir James S. Menteath, Bart., of Closeburn, has kindly furnished the following instance of his feeding sheep with turnip and linseed, under cover, which is well worthy of attention. The experiment was tried at Closeburn Hall, during last winter and spring. Sir James says, "Contiguous to a field there is a small yard and shed, simply and cheaply constructed, floored with slab boards, so that the sheep may lie dry. The boards are not put close together, and have a slope to the yard, so that they are easily swept clean, and soon get dry. No straw or bedding is laid on the boards, but the yard is covered with straw and leaves; and underneath a quantity of peat is laid to absorb the urine. Wooden troughs are placed inside the shed to contain sliced turnips, and bruised linseed and oats, and a low confined manger to hold hay. Every evening the sheep go from the field into the yard and shed. The animals are so fond of their shelter and prepared food, that almost every afternoon the shepherd finds his little flock outside impatiently waiting to be let into their sleeping apartment; and, though no straw is put upon the boards, the animals lie on them quite comfortably. The boards are daily swept clean. The sheep have thriven exceedingly well, and have supplied, all through the winter season and spring, excellent mutton for table as fat as that

feed per day, and never had them so healthy, or looking better. I also gave my cows, after calving, one feed per day, in addition, of course, to their other feeding, and we have been highly pleased with the quality and quantity of their produce. I am now feeding my calves upon boiled linseed and bean-meal, mixed with a portion of milk twice a-day, and they are doing remarkably well. I am convinced, from my experience, that this mode of feeding is the least troublesome, the cheapest, and most productive."

killed at midsummer. This is a simple and a comparatively cheap way of supplying a family with well-fed meat during winter. The example might with great advantage be followed by all families who kill their own meat, as well as by those who feed for the supply of the fat market generally. Besides a great addition to the manure heap is obtained, and no dung is richer than that of well-fed sheep. Ewes to lamb early might be managed as above, and the lambs be thus well sheltered, and be ready early in the season for market."

It is not our intention at present to go into the details of sheep-feeding, this paper having already extended beyond our first design; but such as are desirous of information upon this branch of the subject, we beg to refer to a very useful article on the Norfolk plan of sheep-feeding, by the honourable baronet before alluded to, published in the *Highland Agricultural Journal*, vol. XI., page 1, June 1840. Feeding with cut turnip, hay and oilcake, or grain, under moveable sheds, is explained and recommended in that article; and, since 1840, the improved method of feeding with cooked compound, linseed and crushed grain, as manufactured by the Yorkshire and Suffolk agriculturists, has been found to answer still better.

The preceding practical details are submitted in a simple and statistical form, that they may be easily perused and understood by such farmers as, from their unwearied occupations, have little time or opportunity to read lengthy disquisitions on husbandry. It is thought that the proofs adduced, though not a tithe of what could be brought forward, in favour of the manufacture and use of cooked linseed food, show very clearly the superiority of the modern practice of feeding to the former one of giving large quantities of raw turnip with uncut straw. Let us, in conclusion, however, briefly recapitulate some of the leading features, advantages or disadvantages, of the respective systems.

1. *Saving of turnip or green food.*—This is an important consideration. In the ordinary way of feeding full-sized bullocks on turnip, hay, or straw, from 1¼ to 1½ cwt. (or 168 lbs.) of the bulbs are given per day; but, suppose we average the general allowance at 150 lbs. weight of roots for each animal, it is plain that one-half more is thus used than what is given according to the cooked compound system, though equally cheap and beneficial, as before explained. The adoption of the Marshall system, therefore, will effect a saving of turnip to the extent of one half, without increasing the expense, of the auxiliary food required, beyond the total expense of the old method, as is proved by the Yorkshire, Suffolk, and Cornwall practice and estimates. And so great a saving or breadth of turnip can be very profitably used, either in being fed off with sheep upon the land to manure it, or by being given to store-cattle in sheds or houses, which will vastly improve the young stock, and make the cows and aged cattle more productive and valuable.

2. *Saving of hay and straw.*—There seems to be little doubt that cut hay and straw, properly given with cooked food, will go at least one-third farther than fodder as usually given with large quantities of cold raw turnip. The more of the latter that is given, the more of the former is required to keep the animal's stomach and bowels in a healthy state. Mr Marshall gives an instance in his pamphlet (page 13) which proves this to be the fact. The turnip given by him to some of his cattle was increased to 2 cwt. each per day, when they fell off and became unhealthy. He decreased the turnip to 50 lbs. per day, and gave compound food and cut straw, when they got quite well, and fed fat rapidly.

Formerly it was considered a point of good management to smash down as much straw as quickly as possible with horses and cattle in stables, byres, and cattle sheds, to make manure. This wasteful practice proceeded from ignorance of the nutritious and healthful tendency of straw, when cooked and properly used, to feed both to muscle, flesh, and fat. Given injudiciously it will do little good, the labour of mastication being equal probably to the portion of nutriment so partially extracted from the straw, by the digesting and assimilating organs of the animal, because it is not given in the best preparative condition. But given in a cut and properly prepared state, chemical analysis shows that straw possesses considerable quantities of nutritious matter, calculated to feed and fatten, besides extending the stomach and paunch, so as to produce a healthy physical action of the various organs necessary to carry on rumination and digestion. As to the constituents of straw, and taking wheat straw, the least nutritious as an example, its analysis, as compared with the grain of wheat, is in the following proportions. Taking weight for weight of each, this straw is equal with its grain in water and carbon. It has $\frac{1}{8}$ of the nitrogen or flesh-making element, $\frac{1}{11}$ of the potash, $\frac{1}{8}$ of the soda, $\frac{1}{3}$ of the chlorine, $\frac{2}{3}$ of the sulphuric acid, $\frac{1}{24}$ of the phosphoric acid, and $\frac{1}{2}$ of the magnesia contained in an equal weight of the seed of wheat. These substances go to support and fatten aged cattle; and as regards young animals, which require large supplies of lime and silica to fill up and strengthen their bone, and to increase and firm their muscle, wheat straw, given in a condition to be easily digested and assimilated, is of material importance, as it contains a large proportion of these elements—one-half of the magnesia, two and a half times as much lime as, and seven times more silica than, the grain of wheat itself. (See *Journal of the Royal English Agricultural Society*, vol. III. p. 158.) The more, therefore, a farmer can economise his straw, as well as his turnip, he will be able to keep the more cattle and sheep, to produce more beef and mutton, as well as to make an enlarged quantity of rich manure. The experiments and estimates of the cost of feeding, so as to accomplish these desirable objects, are shown, by the agricultural management of Yorkshire, Norfolk, Suffolk, and Cornwall, to be within the reach of every intelligent farmer. But to economise straw it must be cut into short lengths for cattle, still shorter for sheep, and into mere chaff for horses, —say lengths of inch, half, and quarter inch. Straw used as litter or bedding for cattle ought also to be cut, but not nearly so small as when used for food. Lengths of from 4 to 6 inches will do for bedding, make the straw go further, keep the cattle cleaner, mix well with dry turf, mould, or moss for bedding, and when made into dung will be very soon fit for use, and will work easily and advantageously into the ground at any time, thereby producing good mechanical and chemical effects in the soil.

As to the quality of the manure made from the compound food, given as before described, it is nearly double the value of ordinary farm-yard dung, and thus a material saving is effected in manuring land with it, fewer cart loads being necessary per acre, and of course cartage being saved. The mixture of bean, pea, oat, or barley meal gives a considerable supply of nitrogenised matter to the dung, which is of the first importance in growing grain and pulse crops.

3. The increased use of home-grown produce, containing nitrogenised and fatty matter, is of still greater advantage. First, it enables the farmer profitably to consume his weak or light grain, to save the cartage of it to market, and to get enhanced prices for his heavier or prime stuff taken to market. Next, as in the farmer's small pulse and grain there are various elements to feed to flesh and fat, by the judicious use of these with cheap linseed liquor, he saves large outlays for foreign oilcake—thus, as it were, becoming a good customer to himself for his inferior produce, which will pay better on the backs of his fat cattle than in his market bags; meat so fed bringing considerably more per stone than that got from flabby oilcake cattle. A glance at the chemical composition of such pro-

duce and linseed on the one hand, and of large quantities of turnip and oilcake on the other, will sufficiently illustrate this statement. By recent analysis the subjoined edibles afford the following proportions in every 100 lbs. for feeding to flesh and fat.

	Flesh and Muscle.	Fat.
	lbs.	lbs.
Of Beans,	31	51½
„ Pease,	29	51½
„ Barley Meal,	14	68½
„ Oats,	11	68
„ Hay,	8	68½
„ Potatoes,	2	25
„ Carrot,	2	10
„ Turnip,	1	9

Indian meal also answers well, and should be ranked next to barley meal for feeding both to flesh and fat. This table shows the agriculturist that beans, pease, barley, and oats all conduce to put both flesh and fat upon his cattle. The oily mucilaginous matter which makes oilcake nutritious, also exists in the grain and pulse to a considerable extent. In every 100 lbs. of the following, there is the proportion of oil now to be stated:—In barley, 2½; oats, from 5 to 6; Indian corn, 5 to 9; beans and peas, 2 to 3; wheat straw, 2 to 3; meadow hay, 2 to 5; and in every 100 lbs. of potatoes and turnip, half a pound of oil. In these, then, the farmer has excellent materials wherewith to make a compound containing oily matter to fatten, and albumen, gluten, or mucilage, to put flesh upon his cattle. But by using turnip as the chief material, along with oilcake and uncut straw, a very inferior result will be obtained. In the average daily feeds of 150 lbs. of turnip, the animal will only get (after all his labour of mastication) 15 lbs. of food,—90 per cent of turnip being water, which, when swallowed cold in winter, impedes the fattening process; and of these 15 lbs.

of solid matter, 1½ lbs. only can go to form flesh, and 13½ lbs. to create fat and heat. Giving, then, such food along with oilcake at the rate of 6 or 7 lbs. per day, and uncut straw, it is very clear that it will feed to flabby layers of fat, and cannot produce well mixed meat. The bad effects resulting to stall-fed cattle from getting from 130 to 135 lbs. daily of cold water in their turnip food are obvious. The average temperature of cattle is about 40 degrees higher than the average temperature of our climate. To fatten quickly, they must be kept warm as well as quiet, and whatever diminishes, externally or internally, the temperature of an animal below 100 degrees, retards his fattening, or calls for extra food or carbon to supply the increased combustion and waste of that element (carbon) which is the consequence of increased cold. But the cold, watery, or frozen turnip, whether cut or uncut, particularly the former, tends to drench the stomach and alimentary organs, and to cool down the animal's temperature below the beneficial and fattening point of heat, which causes the loss or waste of carbon or fat referred to. During cold weather, therefore, all roots given to cattle should not only be cut, but brought up to a moderately warm temperature, either by heated air or warm water, and this will be equally advantageous, whether the roots are used with or without the compound cooked food.

Von Thaer, in his excellent work, *The Principles of Agriculture*, says—"These experiments are in the power of every thinking husbandman. He who accomplishes but one, of however limited application, *and takes care to report it faithfully*, advances the science, and consequently the practice of agriculture, and acquires thereby a right to the gratitude of his fellows." . . . "The first care of all societies, formed for the improvement of our science, should be to prepare the forms of such experiments, and to distribute the execution of these among their members." It is thought that the readers of this tract will, on a careful perusal of it, admit that the spirited and judicious agriculturists, whose experiments and practice have been thus explained, well merit the gratitude of their fellow-labourers in this useful branch of farm management. The trouble of the author in compiling or compressing these details will be sufficiently rewarded should the information conveyed lead to the extended practice of an economical and improved system of feeding, so well calculated to advance still farther the good husbandry and true interests of the British farmer.

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